Name:

Problem	1 / 2	3	4/5	6 / 7	Total
Possible	32	21	20	27	100
Received					

DO NOT OPEN YOUR EXAM UNTIL TOLD TO DO SO.

You may use a 3 x 5 card of notes, both sides, and a calculator.

FOR FULL CREDIT, SHOW ALL WORK FOR FINDING EACH SOLUTION.

## FIND THE FINAL ACTUAL VALUE FOR ALL PROBLEMS.

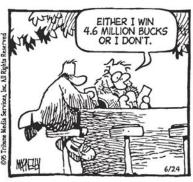












- 17 points 1. An archer (a person who shoots arrows) has a 0.45 probability of hitting a target. He will shoot 10 arrows at the target.
  - /5 What is the probability of hitting the target **exactly** 2 times out of 10?
  - /10 What is the probability of hitting the target at least 2 of the 10 times?

What is the *expected number* of times he would hit the target (out of 10)? That is, if he were to shoot 10 shots, and then another 10 shots, and then another 10 shots, over and over, then on average how many shots (out of 10) would he make?

- 15 points 2. Consider the game at right.
  - /5 Find the expected value of winnings:

Winnings	Probability		
\$1	.6		
\$2	.2		
\$10	.2		

/10 Find the variance and standard deviation of winnings:

		z	A(z)	z	A(z)
21 points	3. The weights of a certain type of apple follow a normal		0000	2.00	0000
21 points		-3.50	.0002	-2.00	.0228
	distribution with mean 150 grams and standard deviation	$-3.45 \\ -3.40$	.0003	-1.95 $-1.90$	.0256
	20 cm.	-3.40 $-3.35$	.0003 .0004	-1.85	.0287 $.0322$
	WH	-3.30	.0004	-1.80	.0359
/5	What percentage of the apples weigh are 120 cm or more?	-3.25	.0006	-1.75	.0401
		-3.20	.0007	-1.70	.0446
		-3.15	.0008	-1.65	.0495
		-3.10	.0010	-1.60	.0548
		-3.05	.0011	-1.55	.0606
		-3.00	.0013	-1.50	.0668
		-2.95	.0016	-1.45	.0735
		-2.90	.0019	-1.40	.0808
		-2.85	.0022	-1.35	.0885
		-2.80	.0026	-1.30	.0968
		-2.75	.0030	-1.25	.1056
/2	W/l - 4	-2.70	.0035	-1.20	.1151
/2	What percentage of the apples weigh 120 cm or less?	-2.65	.0040	-1.15	.1251
		-2.60	.0047	-1.10	.1357
		-2.55	.0054	-1.05	.1469
		-2.50	.0062	-1.00	.1587
		-2.45	.0071	95	.1711
		-2.40	.0082	90	.1841
/1	What percentage of the apples weigh exactly 120 cm?	-2.35	.0094	85	.1977
, 1	what percentage of the appres weigh charty 120 cm.	-2.30	.0107	80	.2119
		$-2.25 \\ -2.20$	.0122 .0139	75 70	.2266 .2420
		-2.20 $-2.15$	.0159	70 65	.2578
		-2.10	.0179	60	.2743
/8	What percentage of the apples weigh between 120 cm	-2.10 $-2.05$	.0202	55	.2912
/ 0	What bereentage of the apples weigh between 120 cm	2.00	.0202	.00	.2012
_					
	and 160 cm?				
-		z	A(z)	z	A(z)
		z	100000000000000000000000000000000000000		A(z)
		50	.3085	1.00	.8413
		50 45	.3085 .3264	1.00 1.05	.8413 .8531
		50 45 40	.3085 .3264 .3446	1.00 1.05 1.10	.8413 .8531 .8643
		50 45 40 35	.3085 .3264 .3446 .3632	1.00 1.05 1.10 1.15	.8413 .8531 .8643 .8749
		50 45 40 35 30	.3085 .3264 .3446 .3632 .3821	1.00 1.05 1.10 1.15 1.20	.8413 .8531 .8643 .8749 .8849
		50 45 40 35 30 25	.3085 .3264 .3446 .3632 .3821 .4013	1.00 1.05 1.10 1.15 1.20 1.25	.8413 .8531 .8643 .8749 .8849
		50 45 40 35 30 25 20	.3085 .3264 .3446 .3632 .3821 .4013	1.00 1.05 1.10 1.15 1.20 1.25 1.30	.8413 .8531 .8643 .8749 .8849 .8944
		50 45 40 35 30 25 20 15	.3085 .3264 .3446 .3632 .3821 .4013 .4207	1.00 1.05 1.10 1.15 1.20 1.25 1.30 1.35	.8413 .8531 .8643 .8749 .8849 .8944 .9032 .9115
		50 45 40 35 30 25 20 15 10	.3085 .3264 .3446 .3632 .3821 .4013 .4207 .4404	1.00 1.05 1.10 1.15 1.20 1.25 1.30 1.35 1.40	.8413 .8531 .8643 .8749 .8849 .8944 .9032 .9115
		50 45 40 35 30 25 20 15 10 05	.3085 .3264 .3446 .3632 .3821 .4013 .4207 .4404 .4602 .4801	1.00 1.05 1.10 1.15 1.20 1.25 1.30 1.35 1.40 1.45	.8413 .8531 .8643 .8749 .8849 .8944 .9032 .9115 .9192
		50454035302520151005 .00	.3085 .3264 .3446 .3632 .3821 .4013 .4207 .4404 .4602 .4801 .5000	1.00 1.05 1.10 1.15 1.20 1.25 1.30 1.35 1.40 1.45	.8413 .8531 .8643 .8749 .8849 .8944 .9032 .9115 .9192 .9265
		50454035302520151005 .00 .05	.3085 .3264 .3446 .3632 .3821 .4013 .4207 .4404 .4602 .4801 .5000 .5199	1.00 1.05 1.10 1.15 1.20 1.25 1.30 1.35 1.40 1.45 1.50	.8413 .8531 .8643 .8749 .8849 .8944 .9032 .9115 .9192 .9265 .9332 .9394
		50454035302520151005 .00 .05 .10	.3085 .3264 .3446 .3632 .3821 .4013 .4207 .4404 .4602 .4801 .5000 .5199 .5398	1.00 1.05 1.10 1.15 1.20 1.25 1.30 1.35 1.40 1.45 1.50 1.55	.8413 .8531 .8643 .8749 .8849 .8944 .9032 .9115 .9192 .9265 .9332 .9394
	and 160 cm?	50454035302520151005 .00 .05 .10 .15	.3085 .3264 .3446 .3632 .3821 .4013 .4207 .4404 .4602 .4801 .5000 .5199 .5398	1.00 1.05 1.10 1.15 1.20 1.25 1.30 1.35 1.40 1.45 1.50 1.55 1.60 1.65	.8413 .8531 .8643 .8749 .8849 .8944 .9032 .9115 .9192 .9265 .9332 .9394 .9452
/5		50454035302520151005 .00 .05 .10 .15 .20	.3085 .3264 .3446 .3632 .3821 .4013 .4207 .4404 .4602 .4801 .5000 .5199 .5398 .5596	1.00 1.05 1.10 1.15 1.20 1.25 1.30 1.35 1.40 1.45 1.50 1.55 1.60 1.65 1.70	.8413 .8531 .8643 .8749 .8849 .8944 .9032 .9115 .9192 .9265 .9332 .9394
	and 160 cm?	50454035302520151005 .00 .05 .10 .15	.3085 .3264 .3446 .3632 .3821 .4013 .4207 .4404 .4602 .4801 .5000 .5199 .5398	1.00 1.05 1.10 1.15 1.20 1.25 1.30 1.35 1.40 1.45 1.50 1.55 1.60 1.65	.8413 .8531 .8643 .8749 .8849 .8944 .9032 .9115 .9192 .9265 .9332 .9394 .9452 .9505
	and 160 cm?	50454035302520151005 .00 .05 .10 .15 .20 .25	.3085 .3264 .3446 .3632 .3821 .4013 .4207 .4404 .4602 .4801 .5000 .5199 .5398 .5596 .5793	1.00 1.05 1.10 1.15 1.20 1.25 1.30 1.35 1.40 1.45 1.50 1.55 1.60 1.65 1.70	.8413 .8531 .8643 .8749 .8849 .8944 .9032 .9115 .9192 .9265 .9332 .9394 .9452 .9505 .9554
	and 160 cm?	50454035302520151005 .00 .05 .10 .15 .20 .25 .30	.3085 .3264 .3446 .3632 .3821 .4013 .4207 .4404 .4602 .4801 .5000 .5199 .5398 .5596 .5793 .5987 .6179 .6368	1.00 1.05 1.10 1.15 1.20 1.25 1.30 1.35 1.40 1.45 1.50 1.55 1.60 1.65 1.70 1.75	.8413 .8531 .8643 .8749 .8849 .8944 .9032 .9115 .9192 .9265 .9332 .9394 .9452 .9505 .9554 .9599 .9641 .9678
	and 160 cm?	50454035302520151005 .00 .05 .10 .15 .20 .25 .30 .35 .40 .45	.3085 .3264 .3446 .3632 .3821 .4013 .4207 .4404 .4602 .4801 .5000 .5199 .5398 .5596 .5793 .5987 .6179 .6368 .6554	1.00 1.05 1.10 1.15 1.20 1.25 1.30 1.35 1.40 1.45 1.50 1.55 1.60 1.65 1.70 1.75 1.80 1.85 1.90 1.95	.8413 .8531 .8643 .8749 .8849 .8944 .9032 .9115 .9192 .9265 .9332 .9394 .9452 .9505 .9554 .9599 .9641 .9678 .9713
	and 160 cm?	50454035302520151005 .00 .05 .10 .15 .20 .25 .30 .35 .40 .45 .50	.3085 .3264 .3446 .3632 .3821 .4013 .4207 .4404 .4602 .4801 .5000 .5199 .5398 .5596 .5793 .5987 .6179 .6368 .6554 .6736	1.00 1.05 1.10 1.15 1.20 1.25 1.30 1.35 1.40 1.45 1.50 1.55 1.60 1.65 1.70 1.75 1.80 1.85 1.90 1.95 2.00	.8413 .8531 .8643 .8749 .8849 .8944 .9032 .9115 .9192 .9265 .9332 .9394 .9452 .9505 .9554 .9599 .9641 .9678 .9713
	and 160 cm?	50454035302520151005 .00 .05 .10 .15 .20 .25 .30 .35 .40 .45 .50 .55	.3085 .3264 .3446 .3632 .3821 .4013 .4207 .4404 .4602 .4801 .5000 .5199 .5398 .5596 .5793 .5987 .6179 .6368 .6554 .6736 .6915	1.00 1.05 1.10 1.15 1.20 1.25 1.30 1.35 1.40 1.45 1.50 1.55 1.60 1.65 1.70 1.75 1.80 1.85 1.90 1.95 2.00 2.05	.8413 .8531 .8643 .8749 .8849 .8944 .9032 .9115 .9192 .9265 .9332 .9394 .9452 .9505 .9554 .9599 .9641 .9678 .9713 .9744 .9772
	and 160 cm?	50454035302520151005 .00 .05 .10 .15 .20 .25 .30 .35 .40 .45 .50 .55 .60	.3085 .3264 .3446 .3632 .3821 .4013 .4207 .4404 .4602 .4801 .5000 .5199 .5398 .5596 .5793 .5987 .6179 .6368 .6554 .6736 .6915 .7088 .7257	1.00 1.05 1.10 1.15 1.20 1.25 1.30 1.35 1.40 1.45 1.50 1.55 1.60 1.65 1.70 1.75 1.80 1.85 1.90 1.95 2.00 2.05 2.10	.8413 .8531 .8643 .8749 .8849 .8944 .9032 .9115 .9192 .9265 .9332 .9394 .9452 .9505 .9554 .9599 .9641 .9678 .9713 .9744 .9772 .9798
	and 160 cm?	50454035302520151005 .00 .05 .10 .15 .20 .25 .30 .35 .40 .45 .50 .55 .60 .65	.3085 .3264 .3446 .3632 .3821 .4013 .4207 .4404 .4602 .4801 .5000 .5199 .5398 .5596 .5793 .5987 .6179 .6368 .6554 .6736 .6915 .7088 .7257	1.00 1.05 1.10 1.15 1.20 1.25 1.30 1.35 1.40 1.45 1.50 1.55 1.60 1.65 1.70 1.75 1.80 1.85 1.90 1.95 2.00 2.05 2.10 2.15	.8413 .8531 .8643 .8749 .8849 .8944 .9032 .9115 .9192 .9265 .9332 .9394 .9452 .9505 .9554 .9599 .9641 .9678 .9713 .9744 .9772 .9798
	and 160 cm?	50454035302520151005 .00 .05 .10 .15 .20 .25 .30 .35 .40 .45 .50 .55 .60 .65 .70	.3085 .3264 .3446 .3632 .3821 .4013 .4207 .4404 .4602 .4801 .5000 .5199 .5398 .5596 .5793 .5987 .6179 .6368 .6554 .6736 .6915 .7088 .7257 .7422 .7580	1.00 1.05 1.10 1.15 1.20 1.25 1.30 1.35 1.40 1.45 1.50 1.55 1.60 1.65 1.70 1.75 1.80 1.85 1.90 1.95 2.00 2.05 2.10 2.15 2.20	.8413 .8531 .8643 .8749 .8849 .8944 .9032 .9115 .9192 .9265 .9332 .9394 .9452 .9505 .9554 .9599 .9641 .9678 .9713 .9744 .9772 .9798 .9821 .9842 .9861
	and 160 cm?	50454035302520151005 .00 .05 .10 .15 .20 .25 .30 .35 .40 .45 .50 .55 .60 .65 .70 .75	.3085 .3264 .3446 .3632 .3821 .4013 .4207 .4404 .4602 .4801 .5000 .5199 .5398 .5596 .5793 .5987 .6179 .6368 .6554 .6736 .6915 .7088 .7257 .7422 .7580 .7734	1.00 1.05 1.10 1.15 1.20 1.25 1.30 1.35 1.40 1.45 1.50 1.55 1.60 1.65 1.70 1.75 1.80 1.85 1.90 1.95 2.00 2.05 2.10 2.15 2.20 2.25	.8413 .8531 .8643 .8749 .8849 .8944 .9032 .9115 .9192 .9265 .9332 .9394 .9452 .9505 .9554 .9599 .9641 .9678 .9713 .9744 .9772 .9798 .9821 .9861 .9878
	and 160 cm?	50454035302520151005 .00 .05 .10 .15 .20 .25 .30 .35 .40 .45 .50 .55 .60 .65 .70 .75 .80	.3085 .3264 .3446 .3632 .3821 .4013 .4207 .4404 .4602 .4801 .5000 .5199 .5398 .5596 .5793 .5987 .6179 .6368 .6554 .6736 .6915 .7088 .7257 .7422 .7580 .7734 .7881	1.00 1.05 1.10 1.15 1.20 1.25 1.30 1.35 1.40 1.45 1.50 1.55 1.60 1.65 1.70 1.75 1.80 1.85 1.90 1.95 2.00 2.05 2.10 2.15 2.20 2.25 2.30	.8413 .8531 .8643 .8749 .8849 .8944 .9032 .9115 .9192 .9265 .9332 .9394 .9452 .9505 .9554 .9599 .9641 .9678 .9713 .9744 .9772 .9798 .9821 .9842 .9861 .9878 .9893
	and 160 cm?	50454035302520151005 .00 .05 .10 .15 .20 .25 .30 .35 .40 .45 .50 .55 .60 .65 .70 .75	.3085 .3264 .3446 .3632 .3821 .4013 .4207 .4404 .4602 .4801 .5000 .5199 .5398 .5596 .5793 .5987 .6179 .6368 .6554 .6736 .6915 .7088 .7257 .7422 .7580 .7734	1.00 1.05 1.10 1.15 1.20 1.25 1.30 1.35 1.40 1.45 1.50 1.55 1.60 1.65 1.70 1.75 1.80 1.85 1.90 1.95 2.00 2.05 2.10 2.15 2.20 2.25	.8413 .8531 .8643 .8749 .8849 .8944 .9032 .9115 .9192 .9265 .9332 .9394 .9452 .9505 .9554 .9599 .9641 .9678 .9713 .9744 .9772 .9798 .9821 .9861 .9878

3

.9918

.9929

2.40

2.45

.90

.95

.8159

.8289

- 10 points
- 4. Suppose you select three balls from 3 orange and 5 blue balls. We are interested in the number of **orange** balls, which we call *X*.
- /8 Complete the probability distribution for the number of **orange** balls:

k	Pr(X = k)
0	10/56
1	30/56
2	
3	

/2 What is the expected number of orange balls?

10 points 5. Find (and **show appropriate work**) the mean, variance and standard deviation of the following ten values:

1 1 1 1 1 5 5 5 10 10

- 22 points
- 6. Suppose we roll a die 20 times. We are interested in getting fives.



/5 What is the probability of getting exactly 2 fives?

## Use the normal curve to approximate the next two probabilities.

/10 What is the probability of getting at least 2 fives?

/7 What is the probability of getting **exactly** 2 fives? (Remember to use the **normal curve** to **approximate** this value.)

5 points 7. In the normal curve at right,  $\mu = 80$  and  $\sigma = 10$ . Find the value of h for which the area of the shaded region is 0.9544.

