PS #4 Assigned 10/4/00 2.4 #1, 6, 7, 11
2.5 #1, 9

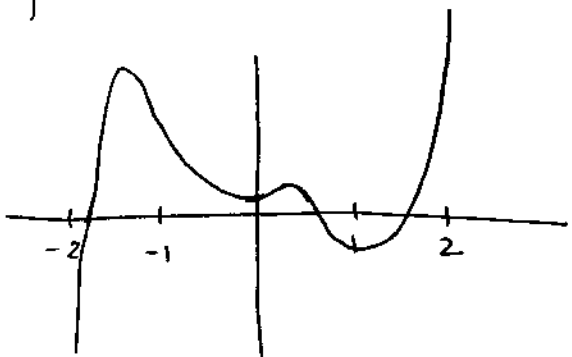
① a) $f(-5)$
b) $f(t)=0$ when $t=-3,-1,4$, so there are 3 solutions.
c) $f(t)=3$ when $t=-4, 1, 3$, so there are 3 solutions
To solve this problem, draw a horizontal line at $f=3$, and find the t-values of the points of intersection of the line and graph.
d) $f(0)=2$ [the value of fxn f at $t=0$]
e) $|f(t)|<1$ when $t=[-3.5,-.5],[3.5,4.5]$

$-1<f(t)<1$ so find the portion of the graph between the horizontal lines $f=1$ and $f=-1$
f) $f(t)=k$ has exactly one solution, i.e. the horizontal line $f=k$ ~~[illegible]~~ intersects the graph of f only once, when $k=[-2,-1],[4,5]$

⑥. (i) the bone's height increases until it reaches the top, and then decreases as it falls back down. The bone's height increases more slowly as it nears the top, since gravity is slowing it down, until it eventually stops at the top and comes back down. So the answer is <u>d</u>.
(ii) velocity versus time
We know that the bone slows down as it nears the top; at the top, the velocity is 0, and then ~~the bone~~ becomes negative as the bone comes back down.
Graph f is the correct answer.
(iii) speed versus time.
speed is the <u>magnitude</u> of velocity; it has no direction. Therefore graph <u>e</u> is the answer since it represents the absolute value of graph f.

(7) $v(t) = 2t^5 - 6t^3 + 2t^2 + 1$

a) graph over interval $-2 \le t \le 2$

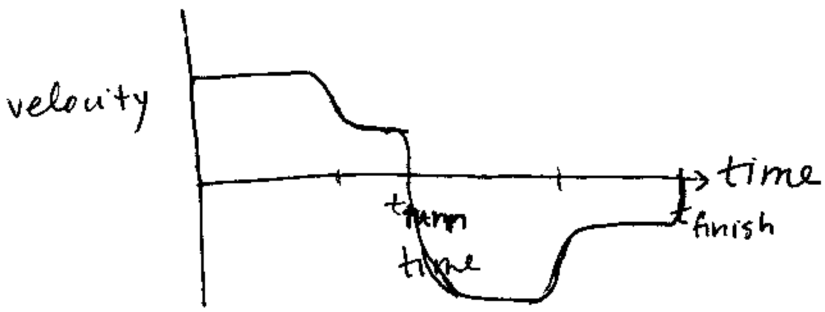


b) object changes direction, i.e. velocity changes sign, at $t \cong -1.90$, $.77$ hours.

c) object is going the fastest when the velocity has the greatest magnitude which is at $t = 2$ hours, $v(2) = 25$ mph.

d) on the interval $0 \le t \le 2$, the velocity is most neg. at $t \cong 1.21$ hours
When I zoom in on this interval, I observe that there is another minimum at $t = 0$ and a maximum at $t \cong .23$ hours

(11)



2.5 (1) $A = \pi r^2 = 2$

$$r^2 = \frac{2}{\pi}$$

$$r = \sqrt{\frac{2}{\pi}} \frac{\sqrt{\pi}}{\sqrt{\pi}} \Rightarrow \boxed{r = \frac{\sqrt{2\pi}}{\pi} \text{ in.}}$$

(9) Between any 2 rational numbers, there are infinitely many irrational numbers