NAME:______SECTION (CIRCLE) 1A 1B 1C 1D 1E 1F

1. Differentiate the function $f(x) = \frac{\sqrt{x} - x}{x^2}$ at x = 4. Write your answer in the box: Solution: $f'(x) = \frac{(\frac{1}{2\sqrt{x}} - 1)x^2 - 2x(\sqrt{x} - x)}{x^4}$ so $f'(4) = \frac{(\frac{1}{4} - 1)16 - 8(2 - 4)}{256} = \frac{4 - 16 + 16}{256} = 1/64.$

(a)
$$f'(4) = \frac{1}{2}$$

(b) $f'(4) = \frac{1}{4}$
(c) $f'(4) = \frac{1}{64}$ CORRECT
(d) $f'(4) = \frac{-3}{2^8}$
(e) none of the above.

2. Find all points where the tangent line to the graph of $f(x) = (x^2 + 1)(x - 1)$ is parallel to the line y = x + 5.

Write your answer in the box:

Solution: we want f'(x) to be equal to the derivative (slope) of y = x + 5, which is 1. Thus we solve

$$1 = f'(x) = (2x)(x-1) + (x^{2}+1)(1) = 3x^{2} - 2x + 1$$

$$1 = 3x^{2} - 2x + 1$$

$$0 = 3x^{2} - 2x.$$

So $3x^2 - 2x = 3x(x - 2/3) = 0$, so that x = 0 or x = 2/3. (a) x = 0 and x = 3/2

- (b) x = 1
- (c) $x = \pm 1$
- (d) x = 0 and x = 2/3 **CORRECT**
- (e) none of the above.